PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.:	10/765,822
Filing Date:	January 27, 2004
Appellant:	Paul E. Krajewski et al.
Group Art Unit:	1728
Examiner:	John S. Maples
Title:	EXTRUDED BIPOLAR PLATES
Attorney Docket:	GP-303999

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APPELLANT'S SECOND APPEAL BRIEF

This is Appellant's Second Appeal Brief filed in accordance with 37 CFR § 41.37 in response to the Examiner's Office Action mailed January 21, 2011 that reopened prosecution in response to the Board of Patent Appeals and Interferences Order Dismissing Appeal mailed November 01, 2010. Appellant's Second Notice of Appeal, pursuant to 37 CFR § 41.31, is being filed concurrently herewith. The Notice of Appeal and Appeal Brief fees enclosed herewith are the difference between the fees paid October 10, 2006 and the current fees due for the Notice of Appeal and Appeal Brief pursuant to 37 CFR § 41.20.

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I. Real Party in Interest

The real party in interest for this appeal is GM Global Technology Operations LLC, a Delaware Limited Liability Company, the assignee of the application.

II. Related Appeals and Interferences

There are no related appeals, interferences or judicial proceedings that will directly affect or be directly affected by the Board's decision in this appeal.

III. Status of the Claims

Claims 1-18 and 22-24 are pending in this application. Claims 1-18 and 22-24 stand rejected. Claims 1-18 and 22-24 are on appeal. Claims 19-21 have been cancelled. No claim has been withdrawn from consideration. No claim has been objected to. No claim has been allowed.

IV. Status of Amendments

All amendments have been entered.

V. Summary of Claimed Subject Matter

The following is a concise explanation of the subject matter involved in the appeal, as required by 37 C.F.R. § 41.37(c)(1)(v). The following explanation is not intended to be used to construe the claims, which speak for themselves, nor do Appellants intend the following explanation to modify or add any claim elements, or to constitute a disclaimer of any equivalents to which the claims would otherwise be entitled, nor is any reference to certain preferred embodiments herein intended to disclaim other possible embodiments.

The following summary indicates certain portions of the specification (including the drawings) that provide examples of embodiments of elements of the claimed subject matter. It is to be understood that other portions of the specification not cited herein may also provide examples of embodiments of elements of the claimed subject matter. It is also to be understood that the indicated examples are merely examples, and the scope of the claimed subject matter includes alternative embodiments and equivalents thereof. References herein to the specification are thus intended to be exemplary and not limiting.

Independent claim 1 claims a fuel cell, such as fuel cell 70 shown in figure 10. The fuel cell 70 includes a first metal bipolar plate 72 including flow channels 74, 76 and 78, and a second metal bipolar plate 80 including flow channels 82, 84 and 86. Paragraph [0022], page 6, line 3. A membrane 92 is positioned between the bipolar plates 72 and 80. Paragraph [0022], page 6, line 10. The bipolar plates 72 and 80 are extruded bipolar plates formed by an extrusion process, such as shown in figure 1. Paragraph [0017], page 4, line 11.

Independent claim 11 claims a metal bipolar plate for a fuel cell, such as bipolar plate 52 shown in figure 8. Paragraph [0021], page 5, line 20. The bipolar plate 52 includes flow channels, such as flow channels 64 extending through the plate 52. Paragraph [0021], page 5, line 28. The bipolar plate 52 is an extruded bipolar plate formed by an extrusion process, such as shown in figure 1. Paragraph [0017], page 4, line 11.

Independent claim 22 claims a fuel cell, such as fuel cell 70 shown in figure 10. The fuel cell 70 includes a metal anode side bipolar plate 80 having anode flow channels 84, cathode flow channels 86, cooling fluid flow channels 82 and edge recesses 90. Paragraph [0022], page 6, line 3. The fuel cell 70 also includes a metal

cathode side bipolar plate 72 having cathode flow channels 78, anode flow channels 76, cooling fluid flow channels 74 and edge recesses 88. Paragraph [0022], page 6, line 3. The fuel cell 70 also includes a membrane 92. Paragraph [0022], page 6, line 10. The bipolar plates 72 and 80 are extruded bipolar plates formed by an extrusion process, such as shown in figure 1. Paragraph [0017], page 4, line 11.

Dependent claim 7 claims that the first and second bipolar plates 72 and 80 include recessed edges 90. Paragraph [0022], page 6, line 5.

Dependent claim 8 claims that end plates 106 are in the recessed edges 90 for securing the first and second bipolar plates 72 and 80 together. Paragraph [0023], page 6, line 18.

Dependent claim 17 claims that the bipolar plate 72, 80 has recessed edges 90. Paragraph [0022], page 6, line 5.

VI. Grounds of Rejection to be Reviewed on Appeal

Whether claims 1-18 and 22-24 should be rejected under 35 U.S.C. §102(e) as being anticipate by U.S. Patent No. 6,893,765 B1 issued to Nishida et al. (hereinafter "Nishida"); and

Whether claims 1-7, 10-17, 22 and 23 should be rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,974,648 B2 issued to Goebel (hereinafter "Goebel").

VII. Argument

A. Claims 1-18 and 22-24 are not anticipated by Nishida

1. Nishida

Nishida discloses a polymer electrolyte fuel cell that includes anode-side separator plates 21 and cathode-side separator plates 31. As discussed in column 5, lines 11-23 and lines 46-50, the separator plates 21 and 31 are fabricated by a pressing and stamping process. The plates 21 and 31 shown in figure 1 of Nishida have a clear stamped plate profile.

2. Discussion of independent claims 1, 11 and 22

Independent claim 1 claims, *inter alia*, a fuel cell that includes a first metal bipolar plate with flow channels, a second metal bipolar plate with flow channels and a membrane formed between the first and second bipolar plates. The first and second bipolar plates are extruded bipolar plates where the flow channels are formed by an extrusion process.

Independent claim 11 claims, *inter alia*, a metal bipolar plate for a fuel cell, where the metal bipolar plate includes a series of flow channels extending through the plate. The bipolar plate is an extruded bipolar plate where the flow channels are formed by an extrusion process.

Independent claim 22 claims, *inter alia*, a fuel cell that includes an anode side metal bipolar plate, a cathode side metal bipolar plate, and a membrane. The anode side metal bipolar plate is an extruded bipolar plate, and the anode side bipolar plate includes anode side flow channels at one side of the anode side metal bipolar plate and cathode side flow channels at an opposite side of the anode side metal bipolar plate. The anode side metal bipolar plate also includes cooling fluid flow channels extending

through a middle portion of the anode side bipolar plate, and the anode side metal bipolar plate further includes a recess at each end of the anode side metal bipolar plate. The cathode side metal bipolar plate is an extruded bipolar plate, and the cathode side bipolar plate includes cathode side flow channels at one side of the cathode side bipolar plate including cathode side flow channels at one side of the cathode side metal bipolar plate and anode side flow channels at an opposite side of the cathode side bipolar plate. The cathode side metal bipolar plate also includes cooling fluid flow channels extending through a middle portion of the cathode side bipolar plate, and the cathode side metal bipolar plate further includes a recess at each end of the cathode side metal bipolar plate. The membrane is positioned between the anode side bipolar plate and the cathode side bipolar plate.

As discussed above, the plates of Nishida are different because they have a clear stamped plate profile. Particularly, an extruded bipolar plate will have a different profile than a stamped bipolar plate. Examples of extruded bipolar plate profiles can be seen in Appellant's figures 2-9. It is the bipolar plates for fuel cells that are made by pressing and stamping manufacturing processes that Appellant is attempting to improve upon. The Examiner has not identified a teaching in Nishida of an extruded bipolar plate for a fuel cell. Appellant submits that Nishida does not disclose a metal bipolar plate for a fuel cell that is fabricated by an extrusion process, and therefore, Nishida cannot teach an extruded metal bipolar plate for a fuel cell. Accordingly, Appellant respectfully submits that Nishida cannot anticipate Appellant's independent claims 1, 11 and 22 because Nishida does not teach extruded metal bipolar plates.

It is the Examiner's position, on page 7 of the Office Action, that the wording "extruded bipolar plate" is a product-by-process limitation, and thus, the application of *In re Thorpe*, 227 USPQ 964, is appropriate. Appellant respectfully disagrees.

Appellant reminds the Examiner that the Examiner has agreed that the claimed bipolar plates are extruded bipolar plates and are structural elements, and the Examiner has also acknowledged that both Nishida and Goebel, discussed below, do not teach extruded bipolar plates. Furthermore, and as discussed on page 4 of the Appeal Brief filed October 10, 2006, the *In re Thorpe* decision specifically addressed a claim for a product made by a process, i.e., a product-by-process claim. Because Appellant's independent claims 1, 11 and 22 are not product-by-process claims, Appellant submits that *In re Thorpe* does not apply to claims 1, 11 and 22.

Furthermore, *assuming arguendo* independent claims 1, 11 and 22 are product-by-process claims, Appellant submits that the language that the bipolar plates are made by an extrusion process adds patentable significance to the claims. MPEP 2113 states, "The structure implied by the process steps should be considered when assessing the patentability of product-by-process claims over the prior art, especially where the product can only be defined by the process steps by which the product is made, or where the manufacturing process steps would be expected to impart distinctive structural characteristics to the final product. See *In re Garnero*, 412 F.2d 276, 279, 162 USPQ 221, 223 (CCPA 1979) (holding "inter-bonded by interfusion" to limit structure of the claimed composite and noting that terms such as "welded," "intermixed," "ground in place," "press fitted," and "etched" are capable of construction as structural limitations.)

Appellant submits that claiming that the bipolar plates are made by an extrusion process does impart a distinctive structural characteristic to the plate because it limits the structure of the claimed bipolar plate similar to the facts in *In re Garnero*, and because an extruded bipolar plate will have a distinctive profile and a structural desirability over bipolar plates made by other processes, such as stamping processes.

With respect to Appellant's argument that the bipolar plate in Nishida has a different profile than Appellant's claimed bipolar plate profile, the Examiner refers to figure 1 of Nishida and asserts that the shape of the flow channels in Nishida is the same as Applicant's flow channels as shown in figure 3 of the present application. Appellant respectfully directs the Examiner's attention to the discussion of figure 3 at paragraph [0019] of the present application, which states that the alternating trapezoidal-shaped flow channels 32 are for a cooling fluid. In contrast, the trapezoidal flow channels 23' and 33' of figure 1 of Nishida are fuel gas channels and oxidant channels, respectively. Thus, Applicant respectfully submits, for this reason as well, Nishida does not teach the same bipolar plate structure as claimed by Appellant.

Independent claim 22 claims, *inter alia*, that the anode side metal bipolar plate and the cathode side metal bipolar plate each include a recess at each end of the plates. It is the Examiner's position, on page 2 of the Office Action, that the bipolar plates 21 and 31 of Nishida, as shown in figure 1, have recesses at the ends of the plates 21 and 31. The Examiner further states that, by virtue of the bipolar plates in Nishida having peaks and valleys, recesses are present.

Appellant respectfully submits that the plates 21 and 31 of Nishida do not include recesses. While the Examiner asserts that "[t]he upper bipolar plate 21, for example, has a recess in the right side edge in which the end plate 37 is placed." As shown in figure 1 of Nishida, recesses are not shown <u>at each end</u> of the plates. Furthermore, nothing in the disclosure of Nishida discusses recesses at each end of the plates. Therefore, Appellant submits that Nishida clearly does not expressly teach recesses at each end of the plates.

MPEP 2112 IV, which states, "The fact that a certain result or characteristic <u>may</u> occur or be present in the prior art is not sufficient to establish the inherency of that

result or characteristic. (Emphasis in original). See *In re Rijckaert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993). MPEP 2112 IV also states that "[I]nherency. . . may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient." *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999). Appellant respectfully submits that the teaching of Nishida, discussed above, does not inherently, i.e., necessarily, teach recesses at each end of the plates. Accordingly, for this reason as well, Appellant respectfully submits that independent claim 22 is not anticipated by Nishida.

3. Discussion of the dependent claims

Dependent claims 7 and 17 claim, *inter alia*, that the first and second bipolar plates include recessed edges. Dependent claim 8 claims, *inter alia*, that end plates are positioned in the recessed edges for securing the first and second bipolar plates together.

As discussed *supra*, Appellant respectfully submits that the plates 21 and 31 of Nishida do not include recesses. As shown in figure 1, Nishida does not show recesses at each end of the plates. Furthermore, nothing in the disclosure of Nishida expressly or inherently teaches recesses at each end of the plates. Furthermore, with respect to claim 8, the Examiner's assertion that "[t]he upper bipolar plate 21, for example, has a recess in the right side edge in which the end plate 37 is placed" is not a logical argument because column 5, line 33 states that reference numeral 37 is "[a]n insulating sheet 37 stuck to the surface having the ribs 33," i.e., reference numeral 37 of Nishida is not an end plate. Thus, Appellant respectfully submits that claims 7, 8 and 17 are not anticipated by Nishida.

B. Claims 1-7, 10-17, 22 and 23 are not anticipated by Goebel

1. Goebel

Goebel discloses membrane electrode assemblies (MEAs) 8 and 10 for a proton exchange membrane (PEM) fuel cell stack, where the MEAs 8 and 10 include bipolar plates 12, 14 and 16. The bipolar plates 12, 14 and 16 include various flow channels, such as flow channels 66, 68 and 70. The Goebel bipolar plates 12, 14 and 16 are not extruded metal bipolar plates as claimed by Appellant. Contrary, the bipolar plates discussed by Goebel are stamped bipolar plates as is clear by the stamped plate profiles shown in figures 3-5.

2. Discussion of independent claims 1, 11 and 22

As with Nishida, the Examiner has not identified a teaching in Goebel of an extruded bipolar plate for a fuel cell. Appellant respectfully submits that nothing in the disclosure of Goebel discloses a metal bipolar plate for a fuel cell that is fabricated by an extrusion process. Accordingly, Appellant respectfully submits that Goebel cannot anticipate independent claims 1, 11 and 22 for the same reasons discussed *supra* with respect to Nishida.

The Examiner asserts that the final product of Goebel and Appellant's claimed invention are the same. For the reasons discussed above with respect to Nishida, Appellant respectfully disagrees. In particular, Appellant submits that claiming that the bipolar plates are made by an extrusion process does impart a distinctive structural characteristic to the plate because it limits the structure of the claimed bipolar plate similar to the facts in *In re Garnero*, discussed *supra*, and because an extruded bipolar plate will have a distinctive profile and a structural desirability over bipolar plates made by other processes, such as stamping processes.

3. Discussion of the dependent claims

Dependent claims 7 and 17 claim, *inter alia*, that the first and second bipolar plates include recessed edges. Dependent claim 8 claims, *inter alia*, that end plates are positioned in the recessed edges for securing the first and second bipolar plates together.

It is the Examiner's position that the bipolar plates taught by Goebel are recessed at the right and left sides of the plates as shown in figures 2-5. The Examiner further states that, by virtue of the bipolar plates in Goebel having peaks and valleys, recesses are formed. Appellant respectfully points out that sub-plates 62 and 64 of a bipolar plate assembly 60, as shown in at least figures 2 and 3 of Goebel, clearly do not show recessed edges as claimed by Appellant. Furthermore, nothing in Goebel discusses recessed edges for securing first and second bipolar plates together. Accordingly, Appellant respectfully submits that dependent claims 7, 8 and 17 are not anticipated by Goebel.

VIII. Conclusion

Appellant respectfully submits that for the reasons discussed above, claims 1-18 and 22-24 are not anticipated by Nishida and claims 1-7, 10-17, 22 and 23 are not anticipated by Goebel. It is therefore respectfully requested that the Examiner's final rejections under 35 USC §102(e) be reversed and that Appellant's claims be allowed.

Respectfully submitted,

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CLAIMS APPENDIX

COPY OF CLAIMS INVOLVED IN THE APPEAL

1. (Previously Presented) A fuel cell comprising:

a first metal bipolar plate including flow channels;

a second metal bipolar plate including flow channels; and

a membrane formed between the first and second bipolar plates, wherein the first and second bipolar plates are extruded bipolar plates where the flow channels are formed by an extrusion process.

2. (Original) The fuel cell according to claim 1 wherein the flow channels in the first and second bipolar plates are selected from the group consisting of square, rectangular, trapezoidal, round, sinusoidal and elliptical shaped flow channels.

3. (Original) The fuel cell according to claim 1 wherein the flow channels include flow channels for a cooling fluid.

4. (Original) The fuel cell according to claim 3 wherein the flow channels extend through a middle portion of the first and second bipolar plates.

5. (Original) The fuel cell according to claim 1 wherein the flow channels include anode flow channels and cathode flow channels.

6. (Original) The fuel cell according to claim 5 wherein the anode and cathode flow channels are provided at outside edges of the first and second bipolar plates.

7. (Original) The fuel cell according to claim 1 wherein the first and second bipolar plates include recessed edges.

8. (Original) The fuel cell according to claim 7 further comprising end plates positioned in the recessed edges for securing the first and second bipolar plates together.

9. (Original) The fuel cell according to claim 1 wherein the first and second bipolar plates are extruded aluminum plates.

10. (Original) The fuel cell according to claim 1 wherein the fuel cell is for an automotive application.

11. (Previously Presented) A metal bipolar plate for a fuel cell, said metal bipolar plate comprising a series of flow channels extending through the plate, said bipolar plate being an extruded bipolar plate where the flow channels are formed by an extrusion process.

12. (Original) The bipolar plate according to claim 11 wherein the flow channels are selected from the group consisting of square, rectangular, trapezoidal, round, sinusoidal and elliptical shaped flow channels.

13. (Original) The bipolar plate according to claim 11 wherein the flow channels include flow channels for a cooling fluid.

14. (Original) The bipolar plate according to claim 11 wherein the flow channels include anode flow channels and cathode flow channels.

15. (Original) The bipolar plate according to claim 11 wherein the flow channels extend through a middle portion of the plate.

16. (Original) The bipolar plate according to claim 11 wherein the flow channels are provided at outside edges of the plate.

17. (Original) The bipolar plate according to claim 11 further comprising recessed edges.

18. (Original) The bipolar plate according to claim 11 wherein the plate is an extruded aluminum plate.

22. (Previously Presented) A fuel cell comprising:

an anode side metal bipolar plate, said anode side metal bipolar plate being an extruded bipolar plate, said anode side bipolar plate including anode side flow channels at one side of the anode side metal bipolar plate for the fuel cell, cathode side flow channels at an opposite side of the anode side metal bipolar plate for an adjacent fuel cell and cooling fluid flow channels extending through a middle portion of the anode side bipolar plate, said anode side metal bipolar plate further including a recess at each end of the anode side metal bipolar plate;

a cathode side metal bipolar plate, said cathode side metal bipolar plate being an extruded bipolar plate, said cathode side bipolar plate including cathode side flow channels at one side of the cathode side metal bipolar plate for the fuel cell, anode side flow channels at an opposite side of the cathode side bipolar plate for an adjacent fuel cell and cooling fluid flow channels extending through a middle portion of the cathode side bipolar plate, said cathode side metal bipolar plate further including a recess at each end of the cathode side metal bipolar plate; and

a membrane positioned between the anode side bipolar plate and the cathode side bipolar plate.

23. (Previously Presented) The fuel cell according to claim 22 wherein the cooling fluid flow channels in the anode side and cathode side bipolar plates are selected from the group consisting of square, rectangular, trapezoidal, round, sinusoidal and elliptical shaped flow channels.

24. (Previously Presented) The fuel cell according to claim 22 further comprising end plates positioned in the recesses at the ends of the anode side and cathode side bipolar plates for securing the anode side and cathode side bipolar plates together.

EVIDENCE APPENDIX

There is no evidence pursuant to §1.130, §1.131 or §1.132.

RELATED PROCEEDINGS APPENDIX

There are no decisions rendered by a court or the Board in any proceeding identified in Section II of this Appeal Brief.